

Methodology: On Self-Criticism

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I would like to begin with a point which may appear to be rather extraordinary, and at any rate is not generally discussed in works on Indian culture. There is a special difficulty for an Indian scholar to try to probe into the scientific activities of ancient India—a difficulty from which a visiting scientist is understandably free. Before passing on to analyse the reasons and remedy for this, let us have a specific example.

The most outstanding visiting scientist to India before the modern period was Alberuni. Born in AD 973 in Persia, he came to India in 1017 as a 'prisoner of war' or as a 'hostage' of King Mahmud of Ghazni, 'kept on honourable terms' and he spent thirteen years in this country. Already he had the reputation of an astrologer-astronomer, which perhaps helped him to develop relations with the court and its head as Tycho de Brahe to the Emperor Rudolf. In any case, he had the opportunity of conversing with Indian pandits, of procuring their help and of buying books. A master of Arabic literature and also of the Greek as translated into Arabic, Alberuni acquired vast knowledge of Sanskrit and became highly efficient, specially in astronomy, mathematics and philosophy of the Indians. He wrote a book on India which is remarkable for its encyclopedic range. We are indebted to Sachau for a magnificent English translation of it along with a penetrating preface. What specially concerns us here is the attitude to Indian culture as recorded in Alberuni's survey of India. He completely dissociated himself with Mahmud and his plundering raids. 'To Alberuni, the Hindus are

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excellent philosophers, good mathematicians and astronomers, though he naively believes himself to be superior to them.'

The enthusiasm he had for Indian philosophy, which he diligently cultivated, appears to us to have been somewhat strange, specially when we remember that he was himself a devout Muslim appealing all the time to the authority of the Quran. As Sachau sums up, 'He seems to have revelled in the pure theory of the *Bhagwadgītā* and it deserves to be noticed that he twice mentions the saying of Vyasa, learn 25 (i.e., the elements of existence) by distinctions etc. Afterwards adhere to whatever religion in life, your end will be salvation.' In one case he even goes so far as to speak of a Hindu scholar as 'enjoying the help of God, which to a Muslim means as much as inspired by God, guided by divine inspiration. These words are in addition to the author's in his paraphrase of the *Byhatsamhitā* of Varahamihira, v. 8. There can be scarcely any doubt that Muslims of later times would have found fault with him for going to such lengths in his interest for those heathenish doctrines.'

Along with profound religious sentiment, Alberuni was also intensely committed to natural science—specially to astronomy and mathematics, in which he acquired remarkable proficiency. What he had no patience at all was for cheating the people, say by verbosity of the priests or wild tales about alchemy like attaining physical immortality or creating gold.

More points may easily be mentioned to establish the fact that Alberuni could not have any special anxiety to vilify an Indian scientist. Yet, he noted something extremely strange about two of the foremost Indian astronomers. This he found while discussing the understanding of eclipse. 'It is perfectly known to the Hindu astronomers', he observed, 'that the moon is eclipsed by the shadow of the earth, and the sun is eclipsed by the moon. Hereon they have based their computations in the astronomical handbooks and other works.' In substantiation of the statement Alberuni quoted at length from the famous *Byhatsamhitā* by Varahamihira, who flourished in c. AD 505–587. Asserted Varahamihira:

As has been mentioned by scholars who enjoy the help of God, an eclipse of the moon is her entering the shadow of the earth and an eclipse of the sun consists in this that the moon covers and hides the sun from us. Therefore the lunar eclipse will never

revolve from the west and the solar eclipse from the east. (v. 8.)

Such an assertion was obviously in flat contradiction to the popular belief based on the mythology of the earlier days, according to which Rahu, imagined to have been just a head without the body, occasionally gobbles the Sun and the Moon for some time and that was the cause of the eclipses. Varahamihira understandably found it necessary to scrap such an ancient view as but imaginary. So he observes: 'the nature of the Head has nothing whatever to do with the lunar and solar eclipses. On this subject the scholars in their books agree.' As in Indian mythology, the demon Rahu as mere head, has no other function than causing eclipses, it simply follows from Varahamihira's assertion that such a demon was a purely fictitious one or a product of primitive ignorance. But Alberuni notes an extremely queer point. The Head, though having no reality, had nevertheless a spell of stupendous authority even on as renowned an astronomer as Varahamihira. Failing to outgrow such an authority, Varahamihira went on to try to explain the Brahmanical view of the theory and practice connected with Rahu. Observed Alberuni:

After having described the nature of the two eclipses as *he* understands them, he complains of those who do not now this and says however, common people are always very loud in proclaiming the Head to be the cause of an eclipse, and they say: if the Head did not appear and did not bring about the eclipse, the Brahmins could not at that moment undergo an obligatory washing.

Since the Head for Varahamihira's scientific analysis was in fact no more than the product of primitive ignorance, the least that is expected of him is obviously an outright rejection of the popular belief and the Brahmanical practice. Strangely however, the astronomer did not at all go in for this. What he actually did was the most incredible rationalizing about the theory and practice concerning the celestial monster. As he observes: 'the reason of this is that the Head humiliated itself after it had been cut off and received from Brahman a portion of the offering which the Brahmins offered to the pyre at the moment of an eclipse.'

Therefore he is near the spot of the eclipse searching for his portion. Therefore at that time people mentioned him fre-

quently, and considered him as the cause of the eclipse, although he has nothing whatsoever to do with it; for the eclipse depends entirely upon the uniformity and the declination of the orbit of the moon.

More passages are quoted by Alberuni to show the flat contradiction in Varahamihira's standpoint. The popularly assumed cause of the eclipse is no more than a myth, yet, it is very much there to receive some portions of the offering made by the Brahmins. Alberuni himself proposes to show a peculiar tolerance for Varahamihira's abject self-contradiction. The latter words of Varahamihira, he observes, 'who, in passages quoted previously, has already revealed himself to us as a man who accurately knows the shape of the World, are odd and surprising. However, he seems sometimes to side with the Brahmins to whom he belongs and from whom he could not separate himself. Still he does not deserve to be blamed, as, on the whole, his foot stands firmly on the basis of the truth, and he clearly speaks out the truth.

But let us leave Alberuni's tolerance for Varahamihira and turn to ourselves. The *Brhatsamhitā* is after all by far the most widely circulated work on astronomy (-astrology) among the Indian scholars, traditional as well as modern. Heaps and heaps of studies in it are produced in the country, yet nowhere is any notice taken of this howling absurdity in the text. It is simply overlooked or bypassed by Indian pandits.

Varahamihira was succeeded among prominent Indian astronomers by Brahmagupta, who wrote his *Brahmasiddhānta* at the age of 30 in AD 625. He is generally considered to have been the greatest of the Indian astronomers, an assessment to which Alberuni subscribed. But then a stranger absurdity in his work is noted by no Indian scholar before or after Alberuni, though Alberuni himself came out very sharply against it. We shall have to quote him at some length.

But look for instance at Brahmagupta, who is certainly the most distinguished of their astronomers. For as he was one of the Brahmins who read in their Puranās that the sun is lower than the moon; and who therefore requires a head biting the sun in order that he should be eclipsed, he shirks the truth and lends his support to imposter . . .

The words in question are found in the first chapter of his *Brahmasiddhānta*.

Some people think that the eclipse is not caused by the Head. This however is a foolish idea for it is *he* in fact who eclipses, and the generality of the inhabitants of the world say that it is the Head who eclipses. The Veda, which is the word of the God from the mouth of Brahman, says that the Head eclipses, likewise the book *Smṛti* composed by Manu, and the *Saṁhitā* composed by Garga, the son of Brahman. On the contrary, Varahamihira, Srisena, Āryabhaṭṭa and Viṣṇucandra maintain that the eclipse is not caused by the Head but by the moon and the shadow of the earth, in direct opposition to all (to the generality of men), and from enmity against the just mentioned dogma. For if the head does not cause the eclipse, all the uses of the Brahmins which they practise at the moment of the eclipse, viz., they are rubbing themselves with warm oil, and other works of prescribed worship, would be illusory and not be rewarded by heavenly bliss. If a man declares these things to be illusory, he stands outside the generally acknowledged dogma, and that is not allowed. Manu says in the *Smṛti*: 'when the Head keeps the sun or moon in eclipse, all waters on earth become pure, and in purity like the water of the Ganges'. The Veda says, 'the Head is the son of a woman of the daughters of the Dvāityas' . . . therefore people practise the well-known works of piety, and therefore those authors must cease to oppose the generality, for everything which is in the Veda, *Smṛti* and *Saṁhitā* is true.

Comments Alberuni:

If Brahmagupta, in this respect, is one of those of whom God says (Koran, *Sura* xxvii. 14), 'they have denied our science although their hearts know them clearly, from wickedness or haughtiness', we shall not argue with him, but only whisper into his ear: If people must under circumstances give up opposing the religious codes (as seems to be your case), why then do you order people to be pious if you forget to be so yourself? Why do you after having spoken such words, then begin to calculate the diameter of the moon in order to explain her eclipsing the sun, and the diameter of the shadow of the earth in order to explain its eclipsing the moon? Why do you compute both eclipses in

agreement with the theory of those heretics and not according to the views of those with whom you think it proper to agree?'

Alberuni himself wanted to explain the obvious anomaly in the writing of such a talented astronomer and he observed: 'I, for my part, am inclined to the belief that that which made Brahmagupta speak the above mentioned words (which involve a sin against conscience) was something of a calamitous fate, like that of Socrates which had befallen him, notwithstanding the abundance of his knowledge and the sharpness of his intellect and notwithstanding his extreme youth at the time. For he wrote the *Brahmasiddhānta* when he was only 30 years of age. If this indeed is his excuse, we accept it, and herewith drop the matter.'

When Alberuni compares Brahmagupta's position to the calamitous fate of Socrates, there is evidently a tone of subdued tolerance in his words. One wishes that some Indian scholar noted the contradiction in Brahmagupta's work, with or without sympathy. But there is not a word from them and the matter is left to be judged only by a visiting scientist. Evidently, the Indian scholars have a peculiar limitation when they try to discuss the situation in science in ancient India. There is something that makes them blind, from which a visiting scientist is understandably free.

What then is this limitation and how are we expected to overcome it?

An Indian historian of Indian science is above all a citizen of India. As such a citizen he cannot be fully free from the preoccupation generally characterizing traditional Indian intellectual atmosphere and coming down more or less in the same form even to our time. Such an atmosphere is a complex phenomenon—some elements of it are helpful for the cultivation of science, others hindering it. As a contemporary citizen of India, it is however difficult for him to be fully critical and discriminating. What operates here is some kind of an all-or-none law. This means that the dregs of a dead past also come down to him, professing to be characteristic of the Indian culture. It is in such an atmosphere that he is born, he breathes, and grows, without any natural urge to discriminate between what is living and what is dead in the general intellectual atmosphere in which he grows up. The professed objectivity of an Indian scholar, if claimed to be absolute, is thus an illusion. But he can be more or less objective in so far as he is consciously critical.

This should make him enthusiastic, e.g., of the astronomical calculations indicative of the actual causes of eclipse, while scrapping the old myth about Rahu or the head. But this is not easily done. Rahu or the head comes down to him as part of the scriptural declarations which he accepts unconsciously, if not consciously. The spell of the hoary texts, continuously declared by the Brahmins to be scriptural revelations, is not easily outgrown. In 1968 the then Prime Minister rightly complained that even our working scientists have some kind of a split personality—accepting science in their professional life and the opposite of science in their private life. One may as well wonder how many of our talented mathematicians and astronomers today, while going much deeper than Varahamihira and Brahmagupta in their understanding of the eclipses, allow in their houses the rituals prescribed in the scriptures to be observed during the eclipses. I am afraid the majority of them do not completely scrap it and that is sure to affect their understanding of ancient science. For obvious reasons, however, a visiting scientist like Alberuni is free from any such obligations and can objectively observe and comment on the absurdities of Varahamihira and Brahmagupta which on the surface tend to elude the notice of the Indian scholars and historians.

This brings us to the main point we have been trying to discuss and that is the need for a good deal of self-criticism for an Indian scientist to probe into the scientific past of India. In a country like our own with a cultural tradition stretching over more than two thousand years, there have been astonishing achievements in science just as there was a good deal of anti-science or superstition masquerading divine knowledge or scriptural declaration. There is always a danger for us to be lured by the willow the wisp as it were of the latter, in order only to be betrayed into the mire of self deception. For a historian of science in ancient India, it is thus not enough to be pandit in the ancient texts nor also in the mere analysis of their subtle implications. What is moreover needed is a conscious cultivation of the spirit of self-criticism so that he is not easily misled into the acceptance or even tolerance for the dead weight of the past, surviving in his mind professing the religious aura.